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Software Piracy in Egypt

Analysis of the Institutional Environment and Efficiency of Enforcement Measures

by

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Abstract

This paper develops the first applied econometric model to examine the efficiency of existing enforcement measures and legal framework on prevailing software piracy rates in Egypt. Hence, it can be used as a tool when discussing new policies concerning the welfare of the interest groups and the pricing of protected software products (i.e., original software products). The model will focus on the available time-series data during 1992-2002 in Egypt. This time period was chosen due to the paucity of quantitative data concerning the model. The institutional environment is examined according to the New Institutional Economics (NIE) to illustrate the legal framework, the informal constraints and the enforcement authorities to support the empirical model. Analytical results show that efficient enforcement of property rights does not only imply increasing legal enforcement through imposing more severe punishments and prosecutions, as decreasing the prices of software plays a much bigger role. Thus relying on legal enforcement authorities alone is not always economically optimal, as it will not be able to deter IPR infringement on its own.

JEL classification

F19, K39, K42, L86

Keywords

Intellectual Property Rights (IPR), Legal Enforcement, New Institutional Economics (NIE), Software Piracy, Egypt

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1. Introduction*

The importance of counterfeiting copyright piracy in the economic and social development of Egypt has been on a rising trend. Different methodologies for estimating piracy and evaluating the enforcement efforts were suggested. However the lack of data and the unique nature of intellectual property (IP), specifically copyright industries and hence different forms of piracy restricted the government to rely on pure theoretical models and implement some simple statistical techniques. This paper develops the first applied econometric model to examine the efficiency of existing enforcement measures and legal framework on prevailing piracy rates and hence on the welfare of the interest groups and the pricing of protected products in Egypt during 1992-2002. The Egyptian software market will be the main focus of the study, as it produces copyright products (software) and ranks among the main growth sectors in Egypt (Ghoneim, 2004). This time period was chosen due to the paucity of quantitative data before 1992 concerning Egyptian copyright industries. In addition, the data representing piracy rates and the amount of losses due to piracy after 2002 were collected using a different methodology which could lead to misleading results if used. Many interviews to gather data on piracy and its impact on the Software Market are carried out. Data on the micro level are used to measure the perception of the market players on the size of the problem. The institutional environment designed to protect software products is examined according to the New Institutional Economics (NIE) to illustrate the legal framework, the informal constraints and the enforcement authorities to support the empirical model.

Actually, Egypt – as most of the developing countries – suffers from an inefficient institutional environment of Intellectual Property Right (IPR) protection in general and copyright protection in specific. People are not really aware of the concept of copyright infringement and its impact on the society. Some authorities claim that IPR infringement creates additional value added[1] to the Egyptian economy; however it has a lot of negative effects on Egypt and its relation with the outside world. Piracy harms both foreign as well as Egyptian Software companies (Corea, 2003). Most firms working in the field of Software development do not suffer from great losses due to weak IPR enforcement in Egypt, due to the fast advancements in the field of IT that make pirated software obsolete by the time new programs are available in the market. Even though, piracy becomes a major threat for firms working in the field of pure software (ready made packages). Especially agencies for multinational producers of software as Microsoft are highly affected by software piracy. In addition, it can be said that reductions in software piracy

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[1] It allows protected products to be sold at prices equal to the marginal cost (MC) of producing an extra unit of the product, it also creates Network externalities and finally it increases worldwide acceptance of the brand.

might lead to a faster growing IT sector which can help jumpstart delayed economies, create new economic opportunities, and help economies become more productive.[2]

The study comprises two main parts. Part one investigates the institutional environment designed to protect copyrights in Egypt according to the NIE with the main objective of arriving at concrete policy recommendations on how to have better utilization of the existing protection system and how to upgrade it for the enhancement of attracting more investments and encourage domestic production of software products in Egypt. For this purpose, the study introduces in the second part a simple model to examine the economic impact of enforcement measures and its consequences on software piracy rates and hence on the welfare of the interest groups and the pricing of protected software products.

[2] For more details, read Hoekman, Maskus and Saggi (2004).

2. The Institutional Environment Protecting Copyrights in Egypt

Once intellectual property has been exposed via the granting of some type of authorization to access, it becomes necessary to protect it from unauthorized use or access caused by copyright pirates (Maskus, 1998a & 1998b). Wrong pricing policies and the low marginal cost of reproduction usually increase the probability of piracy. Watt (2002) extends this definition by pointing out that copyright infringement occurs when some kind of use is made of the copyright, for which the copyright holder's approval was required to but was not obtained. For example, a royalty was due, but was not paid. Thus copyright infringement can be considered a typical case of free riding on a public good and hence a legal framework accompanied by efficient enforcement is needed in order to protect these products.

The Egyptian copyright industry has already established an institutional environment that protects its copyright industries. The only problem concerns the efficiency of the elements of such environment and whether they suit the Egyptian case or not.

According to the New Institutional Economics (NIE), "improving the performance of economies requires the existence of efficient institutions" (North, 1990). Institutions are made up of three main elements: formal rules, informal rules or constraints and enforcement characteristics of the former two elements.

The formal rules (statue law, common law, regulations) can be easily altered; however the informal rules (norms of behavior, self imposed codes of conduct) may change only gradually (Sened, 1997). Thus, a revolutionary change might not result in revolutionary outcomes as expected. In other words norms of behavior and ethics must accompany any set of formal rules. In other words they are considered vital to legitimize any law. Accordingly Third World economies imitating some formal rules of successful Western economies with different cultures and ethics failed to develop. Countries adopting the same formal rules should not expect to have similar performance characteristics, due to the fact that they have different informal norms and enforcement characteristics. In other words it can be said, that the transfer of formal political and economic rules of successful developed countries to developing countries is not a sufficient condition for a similar good economic performance (North and Thomas, 1996).

Thus the coming section of the paper tackles the three above-mentioned elements of the institutional environment protecting the Egyptian copyright industries in details.

2.1 Copyright Laws in Egypt

Generally, copyright laws provide rules that prohibit any infringement action without permission from the author himself. The main purpose of the law is not only to deter pirates but also punish such behavior (Corea, 2003).

Egypt is one of the first countries to adopt a modern IPR system in the Middle East and Africa. It adopted a modern trademark law in 1939, patent law in 1949, and copyright law in 1952. Egypt is a member of the Berne Convention for the Protection of Literary and Artistic Works (September 9, 1886) and the protection in Egypt is consistent with the terms set out by that treaty. The first Egyptian Copyright law, law number 354 for the year 1954, is amended by several laws: Law 430 of 1955; Law 14 of 1968; Law 13 of 1971; Law 34 of 1975; Law 102 of 1980; and Law 38 of 1992 (Hamza, 1996).

Law 38 of 1992 is an extension of the first law and its several amendments to include for the first time innovative technology, such as: software, databases and other computer related applications. Thus, the copyright law extended its protection from the basic copyright products (applied arts, compositions, written works, etc.) to the latest in computer works. It also included relatively higher deterrent penalties for infringers. [3] Egypt actually passed what were essentially TRIPS[4] compatible amendments to its copyright law. However, the failure to impose deterrent penalties has driven to put Egypt on the "Priority Watch List" set up by the 1988 US Trade Act. As a result, law 29 of 1994 emerged to replace law 38 of 1992. This law ensured that computer works are treated exactly as literary works. It has also set out the personal use exemption and has limited it to individuals who copy for personal use only and not any commercial purposes. Copying for use in business is illegal, but so is the copying for the use of another Person. The distribution of videotapes, audiotapes, and computer software was regulated to ensure their performance only by authorized agents (Ministry of Interior, 2003).

Egypt has long been noted as a closed market to US right holders, due to the high prevailing piracy rate. As a result it risks losing the tariff benefits it enjoys under the US Generalized System of Preferences, if its IPR laws are assessed inadequate[5] (IIPA, 2003).

All this has led Egypt to legislate its new IPR law. Law 82 of 2002 provides a firm basis for the protection of intellectual property rights in general and copyrights in specific, and allows for immediate enforcement against pirates. This law provides protection for all forms of authored works and it also includes software products, starting from the date of publication and generally ends 50 years after the author's death. In short, this law gives the author the right to license or deprive the use of his work through copying, selling, renting, or disseminate it through the Internet or computer networks. Under this new law the author's right is protected by both, civil and criminal legislatures. The criminal process involves accusing the infringer and punishing him by a **possible** 3 years jail sentence or a L.E. 5,000-10,000 fine per work copied or both, for first-time offenders depending on the seriousness of the alleged infringement. For second-time infringers, a minimum of 3 months in prison and a fine of at most L.E.50.000 will then be a **must**. The copyrighted material caught and copying equipments will be confiscated and the place of pirating will be shut down. Nevertheless, the civil process involves a lawsuit for

[3] Personal communication of the author with Ms. Ghada Khalifa, head of the BSA office in Cairo. January, 2003.
[4] Trade Related Aspects of Intellectual Property Rights
[5] As it is the prevailing case with china, with 100% tariffs on its trade with the US.

the damage by the owner of copyright. This includes a financial compensation for the right holder that reaches up to millions of Egyptian pounds (Ministry of Justice, 2003).

It can be noticed that there has been lots of improvements concerning the Egyptian copyright laws, but it must be said that there is still room for greater improvements concerning the fine imposed and sentence spent to be able to deter pirates.

2.2 Informal Rules and Ethics concerning the Egyptian Copyright Industries

As mentioned before, the informal rules are essential to legitimize any set of formal rules. Combating piracy often requires a fundamental culture shift in the way people view pirated products. To reduce piracy, governments should increase public awareness of copyright laws, encourage legal use of legitimate copyright products and explain the cost of piracy.

However, before doing so, the government itself should send a clear message showing that they really want to abolish piracy. Especially in the field of software piracy, since the Egyptian government and government agencies were accused to be one of the largest users of pirated software.

Many countries have launched new efforts to manage their software resources. Countries like China, Spain, Taiwan, Ireland, Colombia, Jordan, Thailand, the Czech Republic, and Paraguay, among other nations, have issued software management policies, through conducting internal audits and ensuring that they are using only authorized software. They have issued new policies that serve as a catalyst for greater software protection in both the public and private sectors. Thus, governments are those who should lead such campaigns of combating piracy. Leading, for example is a crucial element for making the fundamental culture shift that can lead to the effectiveness of formal rules and regulations (Mansfield, 1994).

However this is not enough, education and media play a major role for promoting respect for intellectual property. Many countries already have conducted successful public education campaigns underway. Taiwan is an example; they declared 2002 as “Action Year for IPR Protection” and sent letters to all businesses, suggesting a course of action for protecting against illegal use of software. Egypt began its anti piracy campaign, since the beginning of year 2000 in cooperation with the BSA office in Egypt. They have produced songs with video-clips emphasizing religious aspects, explaining the process of piracy and showing its negative effects on the right-holders (creative mind), on employment and on the society as a whole. They also show how pirated products may harm their users. They have shown all this in a way that is understandable for all segments and for all ages of the society.

The Egyptian government has also signed several agreements with software companies to decrease the prices of legitimate software, as to bring the prices of legitimate products close to the pirated ones. Hence to get rid of one of the main reasons of copyright piracy, this is the relatively low price of pirated products.

Governments and industries should work together to launch comprehensive educational campaigns to reduce piracy. They can appeal to the public and business owners to adopt proper guidelines for using legal products and remind them of the legal liabilities and potentially high cost of piracy.

2.3 Enforcement Characteristics of Formal and Informal Rules

The existence of a formal set of rules represented in a countries copyright law and the informal rules aiming at changing the ethics and educational background of a society concerning pirated products are just two elements of an efficient institutional environment. As without some strong enforcement characteristics of both these two elements become non effective.

Enforcement is usually carried by a third party that practices the existing law and punishes whoever tries to break it. This third party enforcement may be practiced by formal (police or other government officers, as inspectors) and informal organizations (syndicates). But it is usually the formal organizations that have the authority to practice enforcement in an effective way. Weak intellectual property in developing countries is mainly due to the absence of efficient governmental enforcement of the law (Leafer, 1991).

Copyright laws in Egypt are generally enforced by two major pools, the Department of Anti-piracy Police affiliated to the Ministry of Interior and the Censorship Unit, affiliated to the Ministry of Culture. But this does not mean that these are the only two authorities, responsible for detecting infringements. There exist three other major police departments, which started to arrest pirates even before the Egyptian copyright law was issued. These are: Public Money Police Authority, Tax Evasion Combat Authority and General Police of Supply and Internal trade.

The main difference between the three above mentioned police departments and the two major enforcement pools is that the two pools are especially formed to enforce the copyright law and to protect the authors rights unlike the other three which combat piracy, serving different means and protecting different rights.

The Censorship Unit, affiliated to the Ministry of Culture

This department includes a special art inspection unit. This unit is responsible for giving licenses to performing artists and doing regular inspections on Cinemas, hotels, firms, and stores renting or selling videotapes, tapes, CDs, or computers. This unit comprises 20 inspectors that are responsible for chasing the raids all over Egypt. They have a head-office located in El-Kasr El-Ainy in Cairo. Table 2.1 shows the number of copyright-infringement cases registered by the inspection unit during the period 1990-2001.

Table 2.1: The number of copyright-infringement cases caught by the Censorship Unit (1990-2001)

Year	Number of cases
1990	149
1991	120
1992	111
1993	196
1994	121
1995	210
1996	209
1997	310
1998	273
1999	582
2000	751
2001	895

Source: Department of Art Products affiliated to the Ministry of Culture, (Unpublished Data), 2003.

From the table mentioned above, it is obvious that starting from 1999, the raids increased dramatically, but inspectors working at the unit made it clear that their number of inspection per month increased, too since mid 1990s. The high profits gained by pirates since mid 1990s, encouraged many people to enter the market of pirated products, as the revenues obtained from pirating exceeds its costs.[6] The inspection unit has registered a case were 500 CDs were caught and the pirate was accused and had to pay a L.E.1.5million according to the Egyptian copyright law. However by one way or the other, the pirate managed to reduce the fine to L.E.5000. This of course reduces his costs and encourages other pirates to continue their successful business.

Pirates or sellers and distributors of pirated copies caught by the inspection unit are then to be handed to the second major enforcement pool, which is the Anti-Piracy police department affiliated to the ministry of interior and are then to be kept in prison until the attorney sets them free or they are kept until trial (this rarely happens).

The Anti-Piracy Police Department, affiliated to the Ministry of Interior

This enforcement unit was established in May, 1996. Before this, the unit was part of another ministry, the Ministry of Supply and Internal Trade. It was separated in 1996 to form an independent unit affiliated to the Ministry of Interior, as a result of the increasing danger of piracy. The headquarter office is located in Mogamaa El-Tahrir and it comprises 4 to 5 officers. It also has 1 or 2 officers in each city all over Egypt. This new enforcement unit has lots of functions, as follows:

[6] Personal communication of the author with Mr Mahmoud Agami, inspector of the Censorship unit, affiliated to the Ministry of Culture. February, 2003.

- Set a plan to protect the different forms of cultural creations, in a way that guarantees efficient provision of the authors' rights.
- Implement the rules set by international conventions.
- Identify all locations of copying, dealing and distributing illegal copyright products and conduct investigations about these locations to take the legal procedures confronting these actions.
- Stay in contact with organizations (public and private) performing legal activities to ensure their commitment to the copyright law.
- Receive complains from right holders and take the required legal procedures to defend their rights.

Table 2.2: The number of infringement cases caught by the police (1997-2003)

Year	Number of cases
1997	2106
1998	2465
1999	3125
2000	3733
2001	4791
2002	6154
2003	6026

Source: Ministry of Interior, (Unpublished Data), 2003.

From the above table, it is obvious that the number of piracy cases registered by the ministry of interior is much larger that the cases registered by the Inspection unit affiliated to the ministry of culture. This is due to the fact that the police register almost every case the inspection unit catches, but the inspection unit does not count the cases caught by the police alone. This, thus, explains the huge number registered by the police. Besides, inspectors stressed on the fact that every policemen, is assigned a minimum number of cases. This minimum number should be achieved by one way or another. Thus, they may include false alarms.[7]

All this sheds light on the deficiencies of the two major enforcement pools. The limited number of police officers responsible for copyright enforcement is not only responsible for deterring piracy but also prostitution cases and other kinds of cases. Besides, they have to work on whatever is most important to the ministry of interior on any particular day. High staff turnover in the Anti-Piracy Police Department allows insufficient time for officers to gain the experience and knowledge necessary to carry out their functions effectively. The assigned number of cases for every police officer is three cases per

[7] Personal communication of the author with Mr Mounir Mansour, inspector of the Censorship unit, affiliated to the Ministry of Culture. February, 2003.

month. The government is only concerned about the quantity and not the quality of cases registered in their documents.[8]
Inspectors of the Censorship Department do not receive information from the product/companies registration division within the same department on a regular basis. This would have helped them to easily identify pirated products. Besides, inspectors are not provided with transportation by the Censorship Department and have to use public transport hampering their ability to confiscate the pirated products they find. Another criticism is that whereas copyright pirates usually work at night, policemen and inspectors raid the suspected sites by day.[9]

A further major drawback of the Egyptian enforcement system is due to the deficiencies of the Egyptian judicial system. The system suffers from delays in the judicial process. Years may pass until the claimant receives the verdict of his case. Due to the long delays, the cost of bringing the case to court increases the cost to the claimant dramatically. Thus, claimants might prefer not to suit the pirate, as the cost and time spent on the case would exceed the expected compensation they would get. The judicial system in Egypt suffers from the lack of experienced judges in the field of copyrights, underestimating, in turn, piracy cases. The reduced fines, imposed by the judges are therefore not deterrent and reduce the cost of pirates.

Accordingly it can be said, that the major authorities responsible for enforcing the laws as well as the Egyptian judicial system still do not tackle piracy cases in a serious way. They still do not realize the importance of IPR protection. That is why further training courses should be provided to police officers and judges to create more efficient enforcement agencies. The Egyptian government has already begun to realize the threat of piracy on one of Egypt's most important copyright industry, which is the software industry. As a result, two main decisions were taken recently by the Egyptian government to ensure the efficiency of enforcing copyrights concerning computer software. The Ministry of Information and Communication shall take over the responsibility of protecting copyrights concerning computer software. Also, a special unit for detecting computer crimes has been established in the information and registration office. This unit is directly affiliated to the ministry of interior. According to these efforts, Egyptian piracy rates are expected to fall beyond expectations.

[8]Personal communication of the author with Ms. Ghada Khalifa, head of the BSA office in Cairo. January, 2003.

[9] Personal communication of the author with Mr. Amr El-Nebeei, manager of the EHE Company (EHE is a reputable Egyptian video taping company). January, 2004.

3. Software Piracy in Egypt

3.1 An Overview

Despite the fact that piracy activities crate additional value added to the Egyptian economy, it has a lot of negative effects on Egypt and its relation with the outside world. Piracy harms both foreign as well as Egyptian Software companies. Firms working in the field of Software development do not suffer from great losses due to weak IPR enforcement in Egypt. The fast advancements in the field of IT make pirated software obsolete by the time new programs are available in the market. Even though, piracy becomes a major threat for firms working in the field of pure software (ready made packages). Especially agencies for multinational producers of software as Microsoft are highly affected by software piracy.

Imports from the U.S. cover 64% of the local IT market in Egypt. The Computer services sector was ranked as the fourth opportunity sector for American business in Egypt in 2001-2002. Losses due to piracy which affect only the US computer software publishers in 2002 are estimated to be $12.7 million at a rate of 52% for business software applications, while the piracy rate concerning the entertainment software reached 90%. These measures differ from the total losses experienced by all software publishers in Egypt (including US publishers) which was estimated by the BSA to be about $15.5 million at a rate of 52% (BSA, 2003).

The world's losses due to software piracy in Egypt are relatively low, when compared to the rates of other African and Arab countries. Table 3.1 shows the piracy rates and the dollar losses of different African countries in 2002-2003.

Table 3.1: Rates and losses of software piracy in Africa

Country Name	**Piracy Rates**	**Revenues Lost due to Piracy (1000)**
Egypt	52%	$15,566
Morocco	58%	$4,449
Nigeria	67%	$5,294
Kenya	67%	$1,093
Zimbabwe	70%	$807
Other Africa	61%	$69,998
Total Africa	48%	$144,370

Source: Annual BSA Global Software Piracy Study, 2003.

The losses due to software piracy in Egypt are relatively high. However it is obvious from table 3.1 that Egypt does not have a relatively high piracy rate when compared to many other African countries. Morocco and Nigeria for example have higher piracy rates

but lower revenue losses resulting due to these rates of piracy. This means that a small piracy rate has major effects on the revenues of the transnational software firms in Egypt, unlike other countries that enjoy an even larger piracy rate but cause a minor loss on the revenues collected. This is exactly the reason behind the concerns of the transnational software firms investing in Egypt.

The large rate of software piracy can be mainly linked to the relatively high prices of original software packages produced by the transnational firms (mainly Microsoft). During the last two years transnational firms agreed to offer some products at reduced prices for some segments of the societies, mainly universities and ministries. This is right after they have reached an agreement with the Ministry of Information and Telecommunication. Such an action decreased the rates of piracy in Egypt. (BSA, 2003)
Nevertheless, the low level of enforcement mainly due to the insufficient work of the authorities responsible for combating piracy and the small finds imposed on accused pirates increased the likelihood of pirating. Pirates will always compare their high revenues with the low probability of getting caught and then choose to take over the low risk. Table 3.2 shows the number of pirated infringement products concerning computer programs and entertainment software caught by the Egyptian police and the inspection unit affiliated to the Ministry of Interior.

Table 3.2: Number of pirated products
concerning computer software in Egypt (1990-2002)

Year	**Number of pirated copies**
1990	0
1991	0
1992	245
1993	126
1994	0
1995	125
1996	40
1997	2,000
1998	13,000
1999	36,000
2000	37,780
2001	71,977
2002	85,377

Source : Ministry of Interior and Ministry of Culture, (Unpublished data), 2003-2004.

As it is shown in the table 3.2, the raids on pirated software distributors and dealers became only since 1992 evidence. However, in 1994, not even a single pirated copy was caught. This can be linked to the fact, that before that time people were not very familiar with copyright laws protecting software products. Besides, the rapid increase in technology experienced by this sector in Egypt during the last 10 years facilitated the process of copying software.

The caught pirated products concerning software became only obvious, since the formation of the general authority of art police affiliated to the Ministry of Interior at the end of 1996. Thus, it is obvious from table 3.2 that in 1997 the number of pirated copies increased by 1960 copies. In 1998 it increased by 11000 copies than it doubled to reach a value of 36000 in 1999. By this time the Egyptian government started an anti piracy campaign and signed two important agreements with micro-soft to provide ministries and university students with cheap legal software to avoid copying the programs. Thus, in 2001/2002 the number of pirated copies increased sharply to reach a number of 85,377 by the end of 2002. Yet, the increasing number of pirated software copies by the Egyptian police does not indicate that they are really fulfilling their job accurately. Interviews showed that the most dangerous pirates are still selling their products in popular places without fearing such raids by the police. Comparing the number of pirated software caught with the number of pirated Audio- or Videotapes, will give the impact that piracy in the field of software is negligible. But this is not true and these results can be linked to the fact that policemen and inspectors only raid the suspected sites of pre-reported pirated software. They do not surprise the dealers or companies when doing their inspections, as in the case of raiding the sites of pirated Audio- or Videotapes. (BSA, 2003), (Ministry of Interior, 2003)

Experts stressed on the fact that weak enforcement of current copyright laws hinders inventions and investments in the field of software. Transnational firms will be reluctant to produce in Egypt, which will have a negative effect on FDI (IIPA 301 report, 2003).

The first Egyptian copyright law of 1952 did not include innovative technology, such as software, databases or any other computer related applications. As early as 1985, Egypt was claimed as a copyright offender by the International Intellectual Property Association (IIPA), due to the several deficiencies of its copyright law. Thus, seven years later, Egypt finally passed amendments to its law in June 1992. Law 38 of 1992 is an extension of the first law and its several amendments to include for the first time innovative technology. Few enforcement actions were taken against large and medium-sized resellers and end-users, which resulted in non-deterrent remedies such as a warning to legalize without the commencement of the necessary legal procedures against those companies involved in copyright infringement.

Thus, it can be said that these amendments were ineffective and fell short of internationally- accepted standards. Police activity has targeted small resellers engaged mostly in selling compilation compact discs (CDs), and there has been little attempt to check resellers engaged in piracy through hard-disk loading. The lack of action by the police against hard disk loaders and end user pirates deeply curtails the effectiveness of anti-piracy efforts in Egypt. The new amendments did not even consider the continued failing of the Egyptian government to revoke false licenses, which in effect blocks access to the market in Egypt for copyright industries (IIPA, 1994).

Hence, in spring 1994, Egypt began a new enforcement campaign on resellers, who load the hard disk of computers with software without obtaining the necessary authorization from the software's copyright holder. During 1995 and the first half of 1996 International Intellectual Property Alliance- (IIPA) members were really satisfied with Egypt's progress, however enforcement activity and particularly the failure to impose deterrent

penalties (fines imposed are totally inadequate to deter piracy, between 1000– 5000 Egyptian Pounds) have prompted IIPA to again focus on piracy issues in Egypt in 1997. During the second half of October 1997, Egypt reactivated raids on resellers and in 1998 they also started raids on business end-users. In June 2002, the Egyptian government issued its new Intellectual Property (IPR) law. Law 82 of 2002 provides a firm basis for protecting copyright materials and author's rights. The new law clearly extends the protection of copyright to the digital environment, including protection of temporary copies, broad exclusive rights of exploitation that appear to encompass digital communications and transmissions over digital networks, and attempted implementation of other key provisions of the World Intellectual Property Organization (WIPO) "Internet" treaties and the WIPO Copyright Treaty.[10] The increased activity of the software industry throughout Egypt has encouraged the authorities to take more actions against pirates, not only in major cities and towns, but also in remote areas. The Egyptian authorities should be encouraged to establish more efficient enforcement techniques to accelerate their own enforcement activities.

Egypt was suffering from a software- piracy rate of 84%[11] in 1994. In 2002, Egypt has successfully reached a software-piracy rate of 52%. Thus Egypt was able to decrease its software piracy rate by 32% in 8 years. Table 3.3 provides a list of the best performing 19 countries that managed to reduce software piracy during 1994-2002. Egypt counts as number four when compared with the rest of the world and counts as number one when compared with countries of the Middle East region regarding its reductions of software piracy rates. Studies by the BSA and the IDC showed that while Egypt reduced its piracy rate by 30% during 1996-2001, its software sector grew 160%, presenting the fastest software and IT growth in the Middle East region.

Table 3.3: Cross country comparison for the best performing 19 Countries in reducing piracy rates during 1994-2002.

Country	Piracy rate in 1994	Piracy rate in 2002	Percentage Change in Piracy
United Arab Emirates	86%	36%	50%
Slovenia	96%	59%	37%
Guatemala	94%	61%	33%
Egypt	84%	52%	32%
Ireland	74%	42%	32%
Turkey	90%	58%	32%
Ecuador	90%	59%	31%
Hungary	76%	45%	31%

[10] For further details about these two treaties, see IIPA, 2004 SPECIAL 301 REPORT, Egypt

[11] Piracy rate is measured by the BSA office by first calculating the number of legal software shipped by US firms minus the total number of total software used by PC users inside Egypt. This number is considered the number of pirated software copies. Then to be able to calculate the percentage rate of piracy this number is divided by the total number of software copies used and the results are multiplied by 100.

Japan	66%	35%	31%
South Africa	64%	34%	30%
Spain	77%	47%	30%
Salvador	97%	68%	29%
Malta	77%	48%	29%
Taiwan	72%	43%	29%
Costa Rica	89%	61%	28%
Croatia	90%	62%	28%
Finland	53%	25%	28%
Netherlands	64%	36%	28%
Saudi Arabia	78%	50%	28%

Source: BSAARABIA (2002). Cross Country Comparison for the Best Performing 19 Countries in Reducing Piracy Rates During 1994-2002. Available at: ww.bsaarabia.com/bsa/press/pdf/bsa_issue_4.pdf.

The enforcement procedure performed by the Egyptian authorities to protect the software industry included several actions. Egyptian authorities have enacted a number of laws and relevant regulations, for example, the new copyright law number 82 of year 2002. Besides, it has also established new enforcement authorities and organizations, such as: the new Anti-Piracy Police Department affiliated to the Ministry of Interior (1996-1997) and the Registration and Information Office (2003) that was established to combat any violations done using computer systems in Egypt. Different entities have participated with the Egyptian government to combat piracy; these are various organs of the Egyptian government as the Ministry of Culture and the Information and Decision Support Center, which reports to the Prime Minister's office. Now, the IIPA participates in the enforcement process in order to achieve effective results. Coordination between different organs of the Egyptian government has been achieved in order to increase public awareness.
The Ministry of Culture worked in collaboration with the software industry on a public awareness campaign, which included an effective TV advertisement campaign against software piracy. Several agreements have been signed to correct for the overestimated prices of software packages. The Egyptian government and Microsoft signed different agreements in order to provide cheaper legal software programs for university students and governmental organizations and ministries.

According to the New Institutional Economics, creating an efficient institutional environment requires establishing formal rules, informal rules and efficiently enforcing both. Enacting laws and regulations by the Egyptian authorities is considered a formal rule, while actions like coordination and signing agreements are supposed to change the norms of behavior of the people and maximize their utility as they will be able to buy cheap legal software, knowing all about the disadvantages of the pirated software. Thus, they are considered informal rules or ethics. While actions like: establishing new enforcement bodies and their collaboration with the Egyptian government involve legal enforcement. Accordingly, it could be said that enforcement does not only include the use of force and authority to apply the rules as it also requires changing the norms of

behavior and maximizing the societies benefit.

Many Researchers have discussed the fact that it is more likely and more efficiently to enforce property rights and reduce illegal copying of software products through price reductions rather than through increased legal enforcement that implies more severe prosecutions. Thus, the sharp decline in software piracy (reaching a rate of 52% in 2002) experienced by Egypt could be mainly linked to the following key factors, depending mainly on price reductions: [12]

The first factor is the agreement signed by the Ministry of Higher Education and Micro-Soft. It implied the provision of **cheaper legal** software programs to university students, a fact that increased consumer utility. Second, is the agreement signed by the Ministry of Communication and Information Technology and Microsoft. It implies the utilization of **cheaper** legal software programs by public ministries and organizations since mid 2000, a fact that increased consumer utility.[13]

Second, the effect of media on public opinion concerning copyright piracy in general and software piracy in specific is also considered an important factor. This factor helped increasing the public awareness concerning pirated software. Software users are know aware of the true danger of pirated software on the micro- (as the user might lose any information, when implementing pirated software) and macro-level (as it will have negative effects on the level of investment, employment rate, and the sector as a whole).
In general, it can be said that software piracy in Egypt harms both US copyright owners trying to invest or sell their products in Egypt as well as the whole Egyptian economy that benefit from such investments.

3.2 Testing the Effect of Enforcement Efforts on Software Piracy in Egypt: An Econometric Approach

As discussed in the previous section, the software piracy rate decreased significantly since the mid of the nineties. To evaluate the efficiency of the different enforcement efforts of the Egyptian government and to test their impact on software-piracy, an econometric model is defined and estimated. This is carried out using a two-stage analysis: In a first step, the effects of Egypt's enforcement actions of the IPRs law on the level of software-piracy in Egypt are determined and tested. In a second step, the results are linked to the performance of the software Industry in Egypt using a correlation index.

The first step is based on Ordinary Least Square (OLS) regression analysis to test the effect of Egypt's enforcement efforts on the rate of software-piracy in Egypt during the period 1992 - 2002[14]. As before that time (1992) there was no law in theory to protect

[12]Personal communication of the author with Ms. Ghada Khalifa, head of the BSA office in Cairo. January, 2003. For more details see: www.bsaarabia.com/bsa/press/pdf/bsa_Issue_4.pdf
[13] Offering the same product with different prices to different groups is also called third degree price differentiation. For more details about this issue, see: Shapiro, C. and Varian, H., 1998
[14] Frequency-Convergent method is implemented to transform the available set of low-frequency data into a higher-frequency set of data, using "quadratic-match sum' type of frequency convergence.

software, thus a legal software market was absent in Egypt. Data concerning (2003) and (2004) are obtained using a different methodology. Recent studies by the BSA office reported that piracy rates in Egypt have increased once again and reached 69% in 2003, and 68% in 2004. The piracy rates, which had appeared in previously, released IIPA studies (1994-2002) were based on the older methodology, which is why they differ from the 2003 and 2004 figures percentages. The new methodology includes piracy rates of certain computer applications such as operating systems, or consumer applications such as PC gaming, personal finance, and reference software. These software applications are now included in the estimated 2003 and 2004 reports; and hence resulting in a significantly higher piracy rates (68%-69%) than was reported in prior years. Thus this figure will be considered doubtful, until they are confirmed by other sources. The Egyptian government defeated the claim of increasing piracy rates by saying that the main aim of changing the methodology applied by the IDSC, is to show an illusive increase in the prevailing software-piracy rates, in order to put more pressure on the Egyptian government to take a further step towards fighting software piracy and stronger legal enforcement of the IPR laws.

The rate of software-piracy in Egypt will be the dependent variable and Egypt's different enforcement actions will be the independent variables. There is no specific measure for IPR-enforcement. However, the level of enforcement depends on the factors that are responsible for creating an efficient institutional environment. Mainly during the period 1996-2002 many efforts were undertaken by the Egyptian government to combat software piracy.

Based upon several interviews with local prominent experts[15], three main actions taken by the Egyptian government concerning combating software-piracy are selected to represent the actual measure of enforcement. The first action is increasing the number of raids conducted by the Censorship Unit affiliated to the Ministry of Culture and the Egyptian police to detect software pirates. The second action is establishing the Anti-Piracy Police Department, affiliated to the Ministry of Interior at the end of 1996 to increase pirates probability of getting caught and punished and thus to increase their marginal cost. The third action is signing several agreements with Microsoft since end of 1999 that include offering the Egyptian universities and ministries legal software at lower prices.

The figures required to calculate the model will be provided mainly from the records of the Ministry of Interior and the Ministry of Culture. Piracy-rates of the Egyptian software industry will be obtained from studies conducted by the IIPA and the BSA.

The estimated model is defined as

(1) $$Y = \alpha_1 + \alpha_2 \ln X + \alpha_3 D1 + \alpha_4 D2 + \varepsilon,$$

where

[15] Personal communication of the author with General Salah Abdel-Fattah: head of the Anti-piracy Police Department, Ghada Khalifa, head of the BSA office in Egypt, Mohamed Hegazy: Intellectual Property Expert; IDSC, Saied Ismail (the software chamber), Mahmoud Agami, Mounir Mansour: Inspectors working in the Censor Ship Department, Ali Abu Shadi (Cinema Chamber)

➔ *Y* represents the yearly rates of software-piracy in Egypt during 1992-2002.

➔ *X* represents the number piracy-cases registered by the Ministry of Culture and the Ministry of Interior each year as an indicator for the degree of effort done by this third party (enforcement) during 1992-2002. The function includes log (x) in order to strike a balance with the left hand side of the equation, which is measured in percentage terms. Thus $\alpha_2 = dY/d\log(X)$ ➔ $\alpha_2 = dY/(dX/X)$. Accordingly α_2 will measure the impact of a relative change in X on Y.

➔ *D1* represents the establishment of General Authority of Art Police at the end of 1996. This Authority is responsible for enforcing the law, detecting piracy, and punishing who ever break the law. The establishment of this authority helped increasing public awareness regarding the negative effects of copyright piracy in general and software piracy in specific. *D1* is a dummy variable, taking the values of zero in case this authority was absent, and the value of 1 otherwise.

➔ *D2* represents the existence of signed agreements between the Egyptian government and Microsoft in 2000, aiming at offering the Egyptian universities and ministries legal software at lower prices, to decrease the level of pirated software implemented by ministries and universities. This will be a dummy variable, taking the values of zero in case these agreements were not signed yet, and values of 1 otherwise.

That is, *X*, *D1* and *D2* are used as proxies for Egypt's IPR-enforcement contribution.

➔ ε represents all the other factors affecting *Y*, but were omitted by the model: It is the measurement error.

3.3 Empirical Results

Based on the data set as described above, the regression analysis delivered the following results[16] [17]:

$$Y = \underset{(108.6^{***})}{0.216} - \underset{(-4.4^{***})}{0.009\ln X} + \underset{(-1.96^{*})}{0.014D1} - \underset{(-8.38^{***})}{0.046D2} \qquad (2)$$

The D-W statistic obtained by the model is about 0.60, indicating the existence of serial autocorrelation. This means, that the error terms of the variables of the model are not independent. This may be due to the existence of one or more important variables affecting the software-piracy rate but were omitted by our model. Three main factors that might influence the prevailing level of software-piracy but are not captured by the variables of the model representing the enforcement contribution of the Egyptian government are: the average income-level of pc-users in Egypt; biasness of the

[16] Table output provided by e-views can be found in the Appendix, tables 4.2 and 4.3.
[17] ***, ** and * indicate a significance levels of 1%, 5%, and 10%, respectively.

organizations measuring the rates of piracy; and the decrease in the price of CD-writers, which led to their quick dispersion. However as $R^2 = 0.99$, which means that 99% of the reductions in software piracy are due to the three chosen variables (X, D1 and D2), this leaves only an effect of 1% for all other factors omitted by the model. To acquire reliable results, the autocorrelation problem should be solved. Running the regression analysis after adding AR (1) and AR (2)[18] the following results were obtained:

$$\underset{(18.0^{***})}{Y = 0.21} - \underset{(-3.3^{***})}{0.009 \ln X} - \underset{(-2.1^{**})}{0.007 D1} - \underset{(-5.6^{***})}{0.018 D2} \quad [AR(1) = 1.59, AR(2) = -0.67] \tag{3}$$

It can be said from the results obtained by the model that software piracy decreased due to the increasing enforcement efforts of the Egyptian government. However it must be said that the variable representing the signing of the agreements between the Egyptian government and Microsoft (D2) is the variable with the highest significance level. However taking the piracy rate of years 2003 and 2004 into consideration to see their impact on the variables of the model will violate some of the previously obtained results. The variable representing the establishment of the general authority of Art Police became insignificant, which means that it did not help in decreasing the software piracy rates. This fact supports the claims of the international software companies and the BSA office as they reported that the Egyptian police suffer from a lot of deficiencies and lack of experience in the field of intellectual property.

In other words, it can be said that the results of the model after correcting for autocorrelation showed that all the three explanatory variables of the model are still significant, however the dummy variable D2 representing the signing of the agreements between Microsoft and the Egyptian authorities to offer cheaper software products is the variable with the highest significance level if not the only significant factor after including years 2003, 2004. This supports the previously mentioned assumption that price cuts are more likely to reduce piracy rates than the execution of more severe punishments alone.

3.4 Linking Enforcement Efforts with the Performance of the Software Industry in Egypt

When testing the relation between the level of piracy and the number of incumbent firms of the IT sector during 1995-2002, the following correlation-matrix was obtained:

Table 3.4: Correlation coefficients between piracy levels and number of IT firms

	Column 1	**Column 2**
Column 1	1	
Column 2	-0.944	1

[18] Where *AR(n)* is an autoregressive equation that includes independent error terms (u_n) for quarter *n*.

Testing the relation between the level of piracy and the level of employment of the IT sector during 1995-2002, the following correlation-matrix was obtained:

Table 3.5: Correlation coefficients between piracy levels and number of IT employees

	Column 1	**Column 2**
Column 1	1	
Column 2	-0.937	1

Consequently, it can be said that linking the results of the model with some macro-economic variables using correlation indices, showed a negative relation between the performance of the industry and the software piracy rate. Decreasing the rate of piracy, among other factors is important for the flourishing of the industry, as it gives a good image about the Egyptian software market which encourages FDI and encourages domestic producers to create in order to compete with the expensive software packages from abroad. Thus creating an efficient enforcement system becomes highly important. Enforcing property rights however does not only imply increasing the legal enforcement through imposing more severe punishments and prosecutions, as decreasing the relatively high prices of software plays a much bigger role. In other words it can be said that increasing legal enforcement is considered a necessary but not sufficient condition for decreasing piracy rates and hence stimulating the growth of the software industry.

4. Conclusion

Software piracy in general has negative[19] as well as some positive[20] economic and social effects on the economy. However it seems that the negative effects outweigh the positive ones. As a result, two main authorities were formed specifically to deter copyright-piracy in Egypt, which are the Anti-piracy Police Department affiliated to the Ministry of Interior and the Censorship Unit affiliated to the Ministry of Culture. In addition to two major decisions that were undertaken only recently by the Egyptian government to ensure the efficiency of enforcing copyrights concerning computer software. First, the Ministry of Information and Communication shall take over the responsibility of protecting copyrights concerning computer software. Second, a special unit for detecting computer crimes has been established in the information and registration office. This unit is directly affiliated to the ministry of interior.

According to these efforts, Egyptian piracy rates have fallen beyond expectations, during 1996-2002. The regression analysis carried in this study is mainly used to test the impact of property rights enforcement on software piracy in Egypt over the period 1992-2002. The model has omitted years after 2002, in order to obtain accurate results. The Piracy rates of these latter two years; were observed by the Business Software Alliance (BSA) using a different methodology than the one they used to use previously in order to put further pressure on the Egyptian authorities to impose more severe punishments and prosecutions concerning copyright infringement. Egyptian IP experts consider these values overestimated and misleading as the Egyptian government has done lots of efforts lately in order to reduce the software piracy rates.

Enforcing property rights however does not only imply increasing the legal enforcement through imposing more severe punishments and prosecutions, as decreasing the prices of software plays a much bigger role. This fact is supported by the results obtained by the model, which showed that the variables representing the legal enforcement of the formal rules by the Egyptian police (*X*, *D1*) are significant but not as strong as the dummy variable (D2) representing the signing of the agreements between Microsoft and the Egyptian authorities to offer cheaper software products. Thus, pricing a copyright product has proven to be the most important factor behind the prevalence of high copyright piracy rate. The existence of strong copyright enforcement has given the owners of copyrights extreme monopoly powers. A fact that has allowed many multinational firms, mainly US firms to overestimate prices and put strong pressure on many countries to reduce software piracy. Accordingly many countries were urged to shift from implementing the

[19] Negative effects of Software Piracy: Diminishing dynamic efficiency, Local software industries crippled from competition with high-quality pirated software from abroad, High prices of software products, Lack of a legitimate market, Lack of secure legal software, and Lost tax revenues.

[20] Positive effects of Software Piracy: Software products sold at P = MC of producing an extra unit of the product, Network externalities, Increasing worldwide acceptance of the software brand and the spread of IT technology, and the emergence of new open-source software.

copyrighted software to implementing free open-source software[21]. This fact has threatened the future of multinational firms investing in other countries.

It must be said, that recent governmental efforts to combat software piracy have been a major success; however the concerned authorities responsible for enforcing the laws as well as the Egyptian judicial system should tackle piracy cases in a more serious way. They still need to acquire more knowledge concerning the importance of IPR protection. Hence public awareness and training programs should be increasingly designed for people working in this field including police officers and judges in order to create a more efficient enforcement mechanism. In addition, public awareness campaigns should be enhanced to pin point the negative effects of software piracy on the Egyptian society.

On the one hand, the legal enforcement is considered to be a necessary but not a sufficient condition for decreasing software piracy and hence for the flourishing of the software industry. On the other hand setting a fair price tends to be a sufficient condition, as the thesis argued. Prices should be taken into consideration when determining an optimal level of enforcement. These findings contradict most studies carried by the BSA office, which assert that sharp declines in copyright piracy can be achieved through prosecuting more severe punishments.

Accordingly the government should try to tackle two main issues, when putting further policies to reduce software piracy.

- First: Determining a price ceiling for imported copyright products that suits the income level of its citizens and force companies to use third degree pricing strategies.
- Second: Taking the idea of implementing free open source software more seriously. The government should compare the resulting net benefits from implementing the Open Source Software on the performance of the software industry in Egypt with the ones resulting from enforcing property rights (through more severe legal enforcement and setting a fair price for legal software).

These issues are also left out to be tackled through future research in this topic.

[21] For more details about Open Source Software, see Appendix.

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Appendix

Background and Rationale of the Study:

The field of Intellectual Property (IP) is sometimes described as a new branch, but its roots are actually quite old. In 1873, foreign exhibitors refused to attend the international exhibition of inventions in Vienna, because there was nothing to guarantee that after the exhibition their ideas will not be stolen, and exploited commercially in other countries, so they decided not to attend at all. The need for international protection of intellectual property became even more important when Johannes Brahms was composing his third symphony and Robert Louis was writing Treasure Island. (World Bank, 2001)

All these previous examples are the output of human mind and intellect that deserve to be protected. As a result, two major treaties in the field of IP protection were adopted. The Paris Convention for the Protection of Industrial Property on March 20, 1883 and the Bern Convention for the Protection of Literary and Artistic Works on September 9, 1886. The Paris Convention was the first major international treaty designed to help the creators of one country to obtain protection in other countries for their creations. (Moroney, 2003) The Berne Convention was to give the author or the creator of any work the right to control and receive payment for the use of their creative work.

The Bern- and the Paris convention have established two separate bureaus to carry out administrative tasks. In 1893, the two bureaus united and formed together a unified bureau**,** called: The United International Bureau for the Protection of Intellectual Property (BIRPI) in Bern, Switzerland, with a staff of seven. This small organization was the procedure of World Intellectual Property Organization (WIPO) of today. WIPO is a dynamic entity located in Geneva with 177 member states, a staff of about 817 from 84 different countries around the world, and with a mission and a mandate that are constantly growing. (WIPO, 2003) In 1974, WIPO became a specialized agency of the UN system of organizations, with a mandate to administer IP matters recognized by the member states of the UN**.** WIPO expanded its role and further demonstrated the importance of IPR in the management of globalized trade in 1996 by entering into a cooperation agreement with World Trade Organization (WTO). The main aim of the WTO, is to promote creativity by protecting the works of the mind. This aim has continued to power the work of the organization for some 120 years, but the scope of the protection and services provided have been developed and expanded radically during that time. The need for international cooperation in the field of Intellectual Property increased rapidly, particularly with the pressure of growing international trade. WTO has constituted an Advisory Committee on the Enforcement of Intellectual Property Rights (IPR), which has initiated a new approach to enforcement. This approach is for the member countries to focus collectively on the real challenges that all countries (developed and developing) face in implementing practical procedure for enforcing rights. The Committee also investigates the best practices and procedures that could be used to effectively enforce property rights, while keeping the time and cost burden at a minimum level. (WTO, 2002)

Egypt was one of the first countries in the Near East and Africa to adopt a Modern Intellectual Property System. The Egyptian government adopted a modern trademark law in 1939, patent law in 1949, and a copyright law in 1952. All these laws have been superseded by law 82 for the year 2002. (Moroney, 2003)

The emergence of new open-source software:

Small firms, many public organizations, even universities who are engaged in pirating software in Egypt and in many other countries are doing so because of the high prices of original software packages. This also applies also to developed countries. Accordingly, almost all high technology universities in Germany for example substituted the copyright software products with other open-source Software, which can be updated and downloaded for free. Any one can download open-source software from the Internet. (Davis, 2004) It can be said that open source software has fostered the growth of a worldwide community of developers contributing to the evolution and improvement of various software programs. Another advantage of open source software is the freedom to learn from other people's techniques and strategies, which enables the user to focus on problem solving.

Egypt's agreements with Microsoft, which included offering the Egyptian universities and ministries copyright software at lower prices benefits Egypt as it saves a lot of money and still owns legal software. However Microsoft will benefit more, as it can guarantee that university students will not think about the open-source software and will remain users of the conventional copyright software. In the case of Vietnam (97% software-piracy rate), Microsoft refused to do any price reductions, and under the terms of a 2001 trade agreement signed with the Unites States, Vietnam is required to establish a much stricter legal enforcement system and more severe prosecutions, as to reduce its level of illegal software copying. At present, the Vietnamese government is significantly increasing its commitment to Open-Source software and, as the centerpiece of this anti-piracy initiative; they are on their way to completely eliminate Microsoft. (Story, 2004)

List of Interviews:

Name	Occupation
General Salah Abd-Elfattah	Head of the Anti-Piracy Police Department in Egypt
Ms. Ghada Khalifa	Head of the BSA office in Cairo
Mr. Mohammed Hegazy	Intellectual Property Expert at the IDSC
Mr. Mahmoud Agami	Inspector at the Censorship Unit
Mr. Mounir Mansour	Inspector at the Censorship Unit
Dr.Nasser Gallal	Associate Professor of Economics, faculty of Commerce, Ain Shams University, Cairo
Mr. Amr El-Nebeei	Manager of the EHE (Video-taping) Company
Professor Mohamed Onsi	Prfessor of Mathematics, Aachen University, Germany
Mr Saied Ismail	Software chamber
Mr Ali Abu Shady	Cinema Chamber

Table 4.1: Values of the model variables

Year	Y	X_1	D_1	D_2
1992	0.90	3	0	0
1993	0.90	3	0	0
1994	0.84	4	0	0
1995	0.84	3	0	0
1996	0.88	2	0	0
1997	0.85	26	1	0
1998	0.85	85	1	0
1999	0.75	170	1	0
2000	0.56	250	1	1
2001	0.58	709	1	1
2002	0.52	1243	1	1
2003	0.69	1808	1	1
2004	0.68	2100	1	1

Source: Ministry of interior, Ministry of Culture, BSA, 2002-2004 (Unpublished Data). Software-Piracy rates are obtained from the global piracy reports published by the BSA and the BSA off ice in Cairo. The number of software piracy cases (1992-1996) registered are obtained from the Censorship unit affiliated to the ministry of culture and the rest of the registered cases (1997-2004) are obtained by the general authority of art police affiliated to the Ministry of Interior.

Table 4.2: Complete E-views output for equation (2)

Dependent Variable: Y1
Method: Least Squares
Date: 12/12/05 Time: 13:02
Sample: 1992:1 2002:4
Included observations: 42
Excluded observations: 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.216156	0.001990	108.6448	0.0000
LOG(X1)	-0.008992	0.002046	-4.395939	0.0001
D1	0.013570	0.006919	1.961256	0.0572
D2	-0.046501	0.005549	-8.380201	0.0000

R-squared	0.950032	Mean dependent var	0.191205
Adjusted R-squared	0.946087	S.D. dependent var	0.035696
S.E. of regression	0.008288	Akaike info criterion	-6.657559
Sum squared resid	0.002610	Schwarz criterion	-6.492067
Log likelihood	143.8087	F-statistic	240.8303
Durbin-Watson stat	0.594998	Prob(F-statistic)	0.000000

Table 4.3: Complete E-views output for equation (3)

Dependent Variable: Y1
Method: Least Squares
Date: 12/12/05 Time: 13:01
Sample(adjusted): 1992:3 2002:4
Included observations: 38
Excluded observations: 4 after adjusting endpoints
Convergence achieved after 10 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.213744	0.011905	17.95348	0.0000
LOG(X1)	-0.009376	0.002818	-3.327470	0.0022
D1	-0.006680	0.003235	-2.065110	0.0471
D2	-0.018277	0.003282	-5.569529	0.0000
AR(1)	1.595581	0.129945	12.27890	0.0000
AR(2)	-0.675599	0.133838	-5.047888	0.0000

R-squared	0.990651	Mean dependent var	0.187993
Adjusted R-squared	0.989190	S.D. dependent var	0.036061
S.E. of regression	0.003749	Akaike info criterion	-8.190592
Sum squared resid	0.000450	Schwarz criterion	-7.932026
Log likelihood	161.6212	F-statistic	678.1642
Durbin-Watson stat	2.305660	Prob(F-statistic)	0.000000
Inverted AR Roots	.80 -.20i	.80+.20i	